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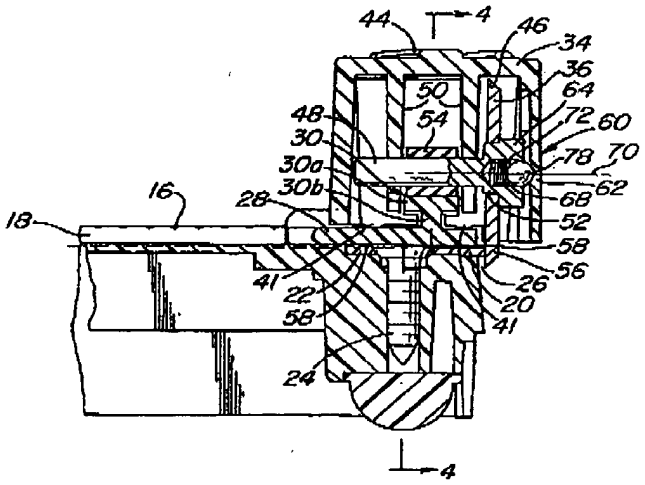
(54) Title: COMPACT TRIMMER




(57) Abstract

A compact trimmer (10) includes a board (12) with a sheet support surface (14) and a fixed cutting edge (20) mounted along one side of the surface. A guide rail (30) is mounted on the board substantially overlying the fixed cutting edge. A housing (34) is slidably engaged on the rail. A circular rotary cutting blade (36) is mounted on an axle (48) within the housing for rotational motion. The axle is oriented perpendicular to the guide rail, and a collar (54) mounted on the axle engages the guide rail, turning the axle and blade as the housing moves along the rail. A portion of the cutting blade is biased in overlapping engagement with the fixed cutting edge by a biasing assembly (60) located withing the housing. The biasing assembly uses a spring (72) and ball (78) housed in a cavity (68) formed in a hub (64), the ball overlying the spring within the cavity and partially extending therefrom to engage a housing sidewall (62).

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# COMPACT TRIMMER

## Field of the Invention

This invention relates to devices for cutting and trimming paper and especially to devices which cut by shearing the paper between two cutting edges.

## Background of the Invention

A common paper cutter found in many offices and businesses is known as the "guillotine" style cutter and comprises a board having a fixed cutting edge mounted on the board and a pivoting blade mounted on the board adjacent to the fixed cutting edge. The pivoting blade can be raised and lowered manually relative to the board via a handle positioned opposite the pivot point of the blade. Paper to be cut is placed on the board overlying the fixed cutting edge with the blade in the raised position, and the blade is then lowered, the blade cooperating with the fixed cutting edge to shear the paper.

Guillotine-style paper cutters, although effective, have several disadvantages. Such cutters are intended to perform relatively heavy-duty cutting tasks and, therefore, tend to be relatively large, heavy and expensive. Both the blade and cutting edge

are made entirely of metal to provide adequate stiffness and strength for cutting more than a few sheets of paper. The blade is constantly exposed presenting a risk of injury, and the method of cutting, i.e., raising and lowering an exposed blade through an arc of several inches, is inherently dangerous. The large size and inherent risk associated with the guillotine-style paper cutter make such devices inappropriate for light-duty cutting, such as performed in the home, in a photographic studio or in many offices.

Summary and Objects of the Invention

A compact trimmer according to the invention comprises a cutting board which lends itself to embodiment in small lightweight form. The cutting board has an upper surface for supporting sheet material to be cut, and a first cutting edge extending lengthwise along one side. An elongated guide member substantially overlies the first cutting edge. The guide member is spaced above the upper surface, thus allowing sheet material to pass between the guide member and the upper surface and overlie the first cutting edge. A housing having means for engaging the guide member is movably supported on the guide member and capable of sliding motion lengthwise along it and the first cutting edge. The housing has a sidewall positioned in a spaced-apart relationship outwardly of the first cutting edge. A cutting blade, which has a second cutting edge, is mounted within the housing between the first cutting edge and the sidewall, a portion of the second cutting edge being in overlapping engagement with the first cutting edge. The blade cooperates with the first cutting edge to cut or trim

sheet material, such as paper, which is positioned on the board overlying the first cutting edge. During cutting, the sheet material is sheared between the second cutting edge and the first cutting edge when the housing is moved along the guide member. The blade portion is held in overlapping engagement against the first cutting edge by means of a biasing assembly disposed between the blade and the housing sidewall.

In a preferred embodiment, the cutting blade is circular and is rotatably mounted within the housing about an axis of rotation through the center of the blade. In this embodiment the second cutting edge extends circumferentially of the blade. The biasing assembly preferably comprises a hub having a shoulder upon which the blade is supported. The hub has a cavity centered on the axis of rotation of the blade and facing the sidewall. The cavity contains a biasing member which extends outwardly to engage the facing sidewall producing biasing forces which react against the sidewall to keep the second cutting edge against the first cutting edge.

Preferably the biasing member comprises a spring and ball, the spring being housed within the cavity and the ball overlying the spring and extending partially from the cavity to engage the facing sidewall of the housing.

It is an object of the invention to provide a paper trimmer which is safe to operate.

It is another object of the invention to provide a paper trimmer suitable for light duty in the home, studio or office.

It is still another object of the invention to provide a paper trimmer which is compact and light in weight.

It is yet another object of the invention to provide a rotary paper trimmer suitable for personal use.

It is another object of the invention to provide a paper trimmer which is relatively inexpensive.

These and other objects of the invention will become apparent from a consideration of the following drawings and detailed description of preferred embodiments of the invention.

Brief Description of the Drawings

Figure 1 is an isometric view of a compact trimmer according to the invention;

Figure 2 is a plan view of the trimmer shown in Figure 1;

Figure 3 is a sectional view on an enlarged scale taken along line 3-3 of Figure 1;

Figure 4 is a sectional view taken along line 4-4 of Figure 3; and

Figure 5 is an exploded isometric view of a detail of the trimmer shown from below.

Detailed Description of the Preferred Embodiment

Figure 1 is an isometric view of a compact trimmer 10 according to the invention. Trimmer 10 comprises a cutting board 12 which provides an upper surface 14 upon which to place sheet material such as paper, photographs and the like for cutting or trimming. Board 12 preferably has indicia 16 displayed thereon to aid in the alignment of the sheet material and insure precise, measured cutting. One or more raised shoulders 18 are formed adjacent to upper surface 14 to provide a convenient edge against which the sheet material can be squarely aligned with respect to the cutting first cutting means described below. Preferably, board 12 is injection molded from plastic material such as a high impact styrene which allows for a strong, stiff but lightweight design. Alternatively, ABS plastic is a suitable material.

As seen in Figures 1 and 2, a first cutting means in the form of a rectilinear cutting edge 20 is arranged lengthwise along a first side of board 12. Figures 3 and 4 show a preferred embodiment of cutting edge 20, formed as an edge of an elongated member 22, preferably a metal strip of stainless steel. Elongated member 22 is mounted flush with upper surface 14 and preferably attached to board 12 by means of screws 24 (Figure 3). First cutting edge 20 extends clear of board 12 as best shown at 26 in the cross sectional view of Figure 3.

Figures 1, 2 and 3 show a preferred guide means, an elongated guide member 28 mounted on board 12, substantially overlying elongated member 22. As seen in Figure 3, guide member 28 includes a guide rail 30 extending upward from the guide member. Preferably, guide rail 30 includes a relatively wide head 30a supported on a narrow upright 30b thus giving the guide rail a "T" shaped cross section further described below. Guide member 28 is preferably molded from a transparent styrene and is attached to board 12 by any suitable means such as by inserting tabs (not shown) projecting from its ends into slots (not shown) formed in raised portions 32 of board 12 located adjacent to each end of guide member 28 and seen in Figures 1 and 2. Guide member 28 should be positioned to be spaced above upper surface 14 and elongated member 22, and rail 30 should extend beyond the shoulders 18 to the positions marked "A" for reasons explained below.

Figures 1 and 5 show a blade housing 34 for mounting a second cutting means, the second cutting means being a blade and preferably a circular cutting blade 36. The housing has means 38 for engaging guide rail 30 for sliding motion along the length of guide member 28. As seen in Figure 5, rail engaging means 38 preferably comprises two pairs of spaced flanges 40a and 40b defining a pair of spaced apart "T" shaped apertures 42 through which guide rail 30 extends, thereby constraining housing 34 to move linearly along a predetermined path defined by the guide rail, all other motions being prevented. Housing 34 is preferably molded from ABS plastic material and has raised gripping segments 44 to facilitate manual gripping to effect the sliding motion.

Rail engaging means 38 further comprises standoffs 41 which extend downwardly from housing 34 as seen in Figures 3 and 5. Standoffs 41 are preferably hemi-cylindrical in shape and serve to space the lower portion of the housing away from elongated guide member 28 in order to reduce friction between the two components during relative motion.

Cutting blade 36 is preferably a rotary cutting blade made of steel, 12L-14 being preferred due to its ready machinability. The blade has a circular shape and a second cutting edge 46 is disposed about its circumference. Blade 36 is rotatably mounted within housing 34 on an axle 48 oriented perpendicularly to guide rail 30. Axle 48 rides in two bearings 50, preferably integrally molded within housing 34 and flanking guide rail 30, as best seen in cross section in Figure 3. Blade 36 is supported on a shoulder 52 extending from axle 48. The blade is preferably staked onto the shoulder, the staking preventing it from rotating independently of axle 48.

To rotate blade 36 an annular friction collar 54, seen in Figures 3-5, is positioned coaxially on axle 48 between bearings 50. Collar 54 engages the top of guide rail 30 when housing 34 is moved along guide member 28. Frictional forces between the collar and the guide rail cause the axle to turn as the housing moves relative to the guide rail, the arrangement functioning as a toothless rack and pinion. Preferably, axle 48 is made of metal and collar 54 is of a resilient material having a relatively high coefficient of friction, such as rubber, to provide for

positive frictional contact between the collar and the rail as well as the collar and the axle.

Blade 36 is mounted adjacent to and aligned parallel to first cutting edge 20 with a portion 56 of second cutting edge 46 in overlapping engagement with first cutting edge 20, as seen in Figure 3. Because the blade overlaps the first cutting edge, it is necessary to provide positions, denoted "A" at either or preferably both ends of guide member 28 wherein guide rail 30 extends beyond the boundary of upper surface 14 marked by shoulders 18. When housing 34 is in either position marked "A", blade 36 does not obstruct the gap 58 (seen in Figure 3) between guide member 28 and elongated member 22 at any point along upper surface 14. This allows sheet material to be positioned anywhere on upper surface 14 in overlying relation with first cutting edge 20 without the need to pivot guide member 28 out of the way as required for other trimmers.

Effective shearing of the sheet material requires a biasing means for biasing blade 36 against first cutting edge 20, thus keeping the overlapping blade portions in contact. The biasing means is preferably in the form of biasing assembly 60 (see Figures 3 and 5), which extends from axle 48 and is interposed between blade 36 and a sidewall 62 of housing 34. Sidewall 62 is spaced outwardly from blade 36 on the side of the blade facing away from the first cutting edge 20, thus, providing a stiff structure against which to react the biasing forces of biasing assembly 60.

As seen in Figures 3 and 5, biasing assembly 60 preferably comprises a hub 64 extending from axle 48 and disposed between blade 36 and housing sidewall 62. Hub 64 has a cavity 68 preferably centered on the axis of rotation 70 of blade 36 as defined by axle 48. Cavity 68 contains a biasing member, preferably comprising a coil spring 72 and a ball 78, made of steel for durability. Spring 72 resides within cavity 68 and ball 78 overlies the spring and extends partially out of the cavity, as seen in Figure 3. Spring 72 forces ball 78 against housing sidewall 62, which serves as a reaction point for the spring, forcing blade 36 into overlapping interengagement against first cutting edge 20. Axle 48 is free to slide laterally in bearings 50 to ensure that spring 72 and ball 78 provide effective biasing action to keep the cutting edges engaged. Ball 78 is sized to fit easily within cavity 68 and its spherical shape insures that it will not cause the axle to bind or lock and prevent rotation of the axle and rotary blade.

In operation, sheet material, for example, paper, is placed on upper surface 14 with the portion to be trimmed overlying the first cutting edge 20. The operator can align the paper using shoulders 18 and/or the indicia 16 for precision cutting. Preferably housing 34 is located at either position marked "A" on guide member 28 so that blade 36 does not interfere with the placement of the paper on the upper surface. Once the paper is placed as desired, the operator grips housing 34 and slides it along guide member 28. Within the housing, collar 54 frictionally engages the top of rail 30 and forces blade 36 to turn via axle 48. Blade 36 encounters the portion of the paper overlying first

## CLAIMS

What is claimed is:

1. A sheet cutting apparatus, comprising:

a cutting board having a first side and an upper surface for support of a sheet to be cut;

an elongated member defining a first cutting edge adjacent to said first side of said board and extending lengthwise thereof;

an elongated guide member mounted in substantially overlying relationship with said first cutting edge and spaced apart from said upper surface;

a blade assembly comprising a blade housing supported on said guide member, said blade housing being movable on said guide member along a predetermined path extending lengthwise of said first cutting edge from a first position on said board wherein said blade assembly does not overlie said upper surface;

a cutting blade mounted within said blade housing adjacent to said first cutting edge, said blade having a second cutting edge, a portion of said second cutting edge being positioned in overlapping engagement with said first cutting edge and cooperating therewith to cut sheet material positionable on said upper surface in overlying relationship with said first cutting edge;

said blade housing having a sidewall spaced from said blade on the side away from said first cutting edge; and

a biasing assembly disposed between said blade and said sidewall for biasing said blade against said first cutting edge.

2. A sheet cutting apparatus according to Claim 1, wherein said biasing assembly comprises a biasing member applying a biasing force between said blade and said sidewall to force said blade against said first cutting edge, said biasing assembly further comprising a cavity positioned between said blade and said sidewall, said cavity housing said biasing member.

3. A sheet cutting apparatus according to Claim 1, wherein:

said blade comprises a circular cutting blade being rotatably mounted and having a centrally located axis of rotation, said blade having said second cutting edge circumferentially disposed thereon; and

said biasing assembly comprises a hub extending from the center of said blade and having a cavity centered on said axis of rotation, said cavity facing said sidewall, said biasing assembly further comprising a biasing member disposed within said cavity and extending therefrom to interengage said sidewall.

4. An apparatus according to Claim 3, wherein said biasing member comprises a spring and ball, said spring being housed within said cavity and said ball overlying said spring and partially extending from said cavity to interengage said sidewall.

5. An apparatus according to Claim 3, wherein said elongated guide member comprises a rail having a "T" shaped cross section and said blade housing comprises at least one "T" shaped aperture positioned therein, said rail interfitting within said aperture.

6. An apparatus according to Claim 5, further comprising an axle assembly extending from said hub opposite said cavity along said axis of rotation, said axle assembly being rotatably mounted and oriented substantially perpendicular to said rail, a surface portion of said axle assembly being in frictional contact with said rail, said axle assembly being rotated about said axis of rotation, and thereby causing said blade to rotate, when said housing is slidably moved lengthwise along said rail.

7. An apparatus according to Claim 6, wherein said axle assembly comprises an elongated axle and an annular collar disposed coaxially on said axle, said collar being in substantially overlapping relation with said rail and forming said axle assembly surface portion in frictional contact with said rail.

8. An apparatus according to Claim 7, wherein said axle is made of metal and said collar is made of a material having a high coefficient of friction.

9. An apparatus according to Claim 8, wherein said collar is made of a resilient material.

10. An apparatus according to Claim 1 wherein said blade housing further comprises a plurality of standoffs extending downwardly from said blade housing and engaging said elongated guide member.

11. An apparatus according to Claim 10, wherein said standoffs are hemi-cylindrical in shape.

12. A sheet cutting apparatus, comprising:

means providing a surface for supporting the sheet material to be cut, said surface having a first side;

a first cutting means for cutting the sheet material, said first cutting means defining a rectilinear cutting edge disposed along said first side;

a cutter housing movably disposed above said surface for sliding motion along said first side, said cutter housing comprising a cutting blade means for cutting sheet material supported on said surface, said cutting blade means being arranged within said cutter housing and having a cutting edge portion disposed in parallel to and in overlapping engagement with said rectilinear cutting edge;

a guide means for guiding said cutter housing along said first side, said guide means being disposed in substantially parallel, overlying relation to said first cutting means and spaced above said surface, said cutter housing further comprising means for engaging said guide means; and

a biasing means for biasing said cutting blade means into engagement with said rectilinear cutting edge, said biasing means being disposed within said cutter housing outwardly of said rectilinear cutting edge and said cutting blade means.

13. An apparatus according to Claim 12, wherein said first cutting means comprises an elongated member positioned flush with said surface along said first side, said rectilinear cutting edge being arranged lengthwise of said member.

14. An apparatus according to Claim 13, wherein said cutting blade means comprises a rotary blade having a circular shape and a circumferentially disposed cutting edge.

15. An apparatus according to Claim 14, wherein said cutting blade means further comprises an elongated axle rotatably mounted within said housing, said axle being oriented substantially perpendicularly to said first side, said rotary blade being mounted on said axle for rotational motion, said cutter housing further comprising a sidewall disposed in a spaced-apart relation outwardly of said rectilinear cutting edge and said blade and oriented substantially perpendicularly to said axle, said biasing means being disposed between one end of said axle and said sidewall.

16. An apparatus according to Claim 15, wherein said biasing means comprises a hub mounted on said one end of said axle between said rotary blade and said sidewall, said hub having a cavity therein facing said sidewall, said biasing means further comprising a spring located within said cavity and a ball overlying said spring, said ball extending partially from said cavity and interengaging said sidewall.

17. An apparatus according to Claim 15, wherein said guide means comprises a rail having a "T" shaped cross section and said means for engaging said guide means comprises a "T" shaped aperture within said cutter housing, said rail interfitting with said aperture, said cutter housing being slidable along said rail.

18. An apparatus according to Claim 17, wherein said cutting blade means further comprises a collar coaxially mounted on said axle in overlying relationship with said rail, said collar frictionally engaging said axle and said rail and thereby causing said axle to rotate when said cutter housing is slidably moved along said rail.

19. A biased cutting assembly for use with a board having a cutting edge on one side, said cutting assembly comprising:

a housing having a sidewall;

a cutting blade mounted within said housing in a parallel, spaced-apart relation to said sidewall;

a hub extending from said blade and disposed between said blade and said sidewall, said hub having a cavity disposed therein facing said sidewall;

a biasing member disposed within and extending from said cavity for urging said blade away from said sidewall.

20. A biased cutting assembly according to Claim 19, wherein said biasing member comprises a spring and ball, said spring being disposed within said cavity and said ball overlying said spring and extending partially from said cavity and impinging on said sidewall.

21. A biased cutting assembly according to Claim 20, wherein said spring is a coil spring.

22. A biased cutting assembly according to Claim 19, wherein said cutting blade comprises a rotary cutter rotatably mounted within said housing.

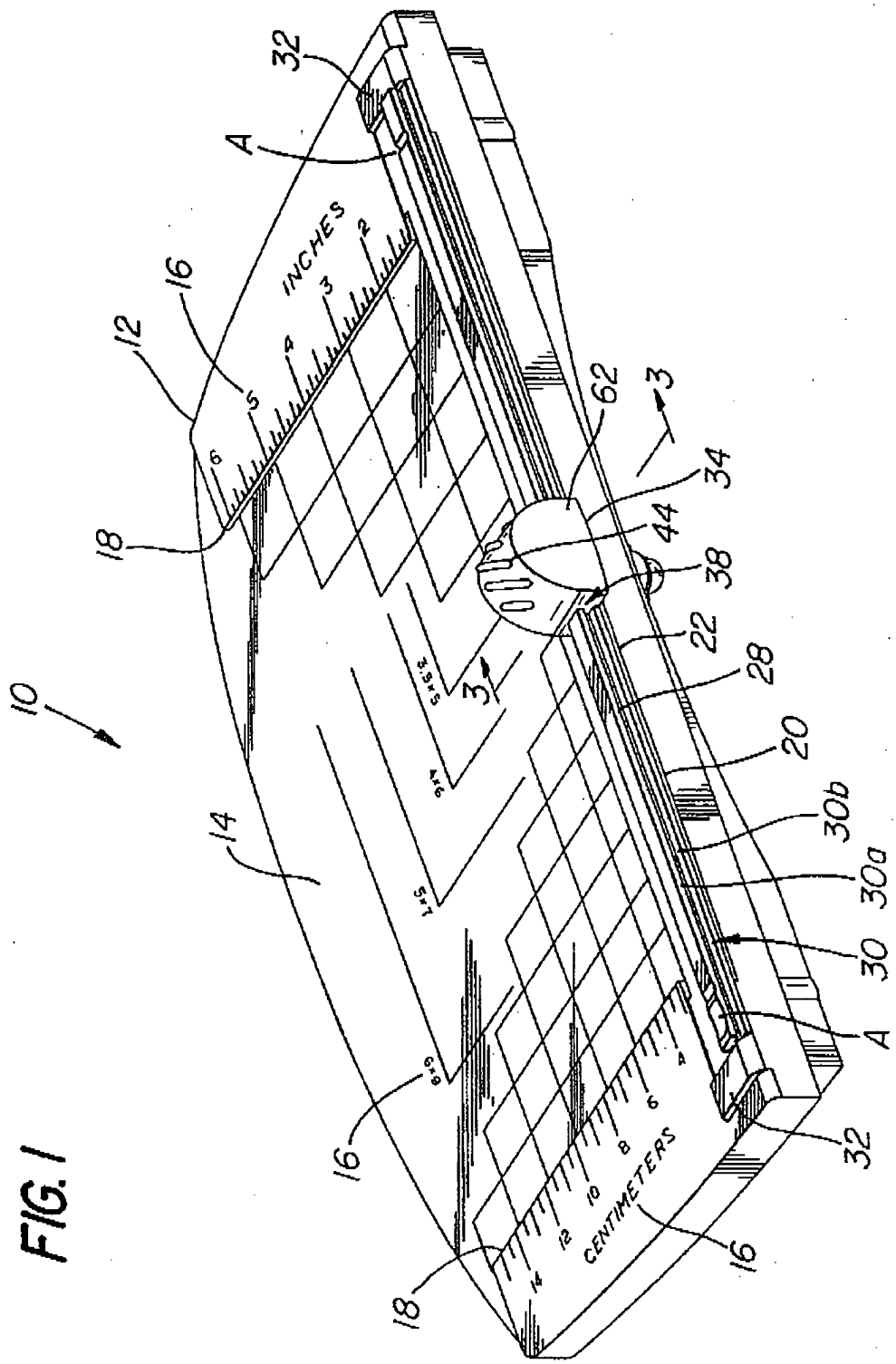



FIG. 1

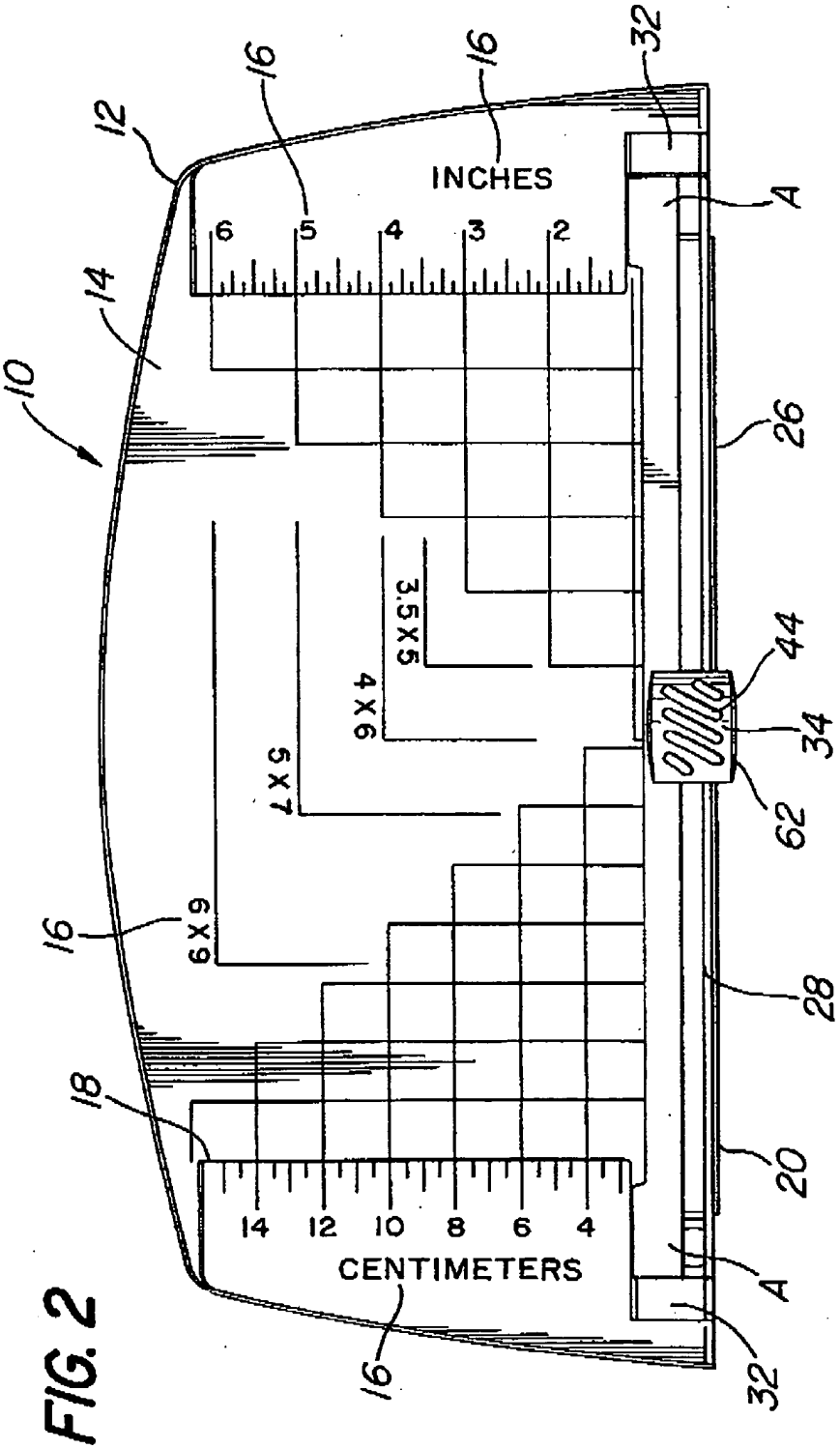



FIG. 2

FIG. 3

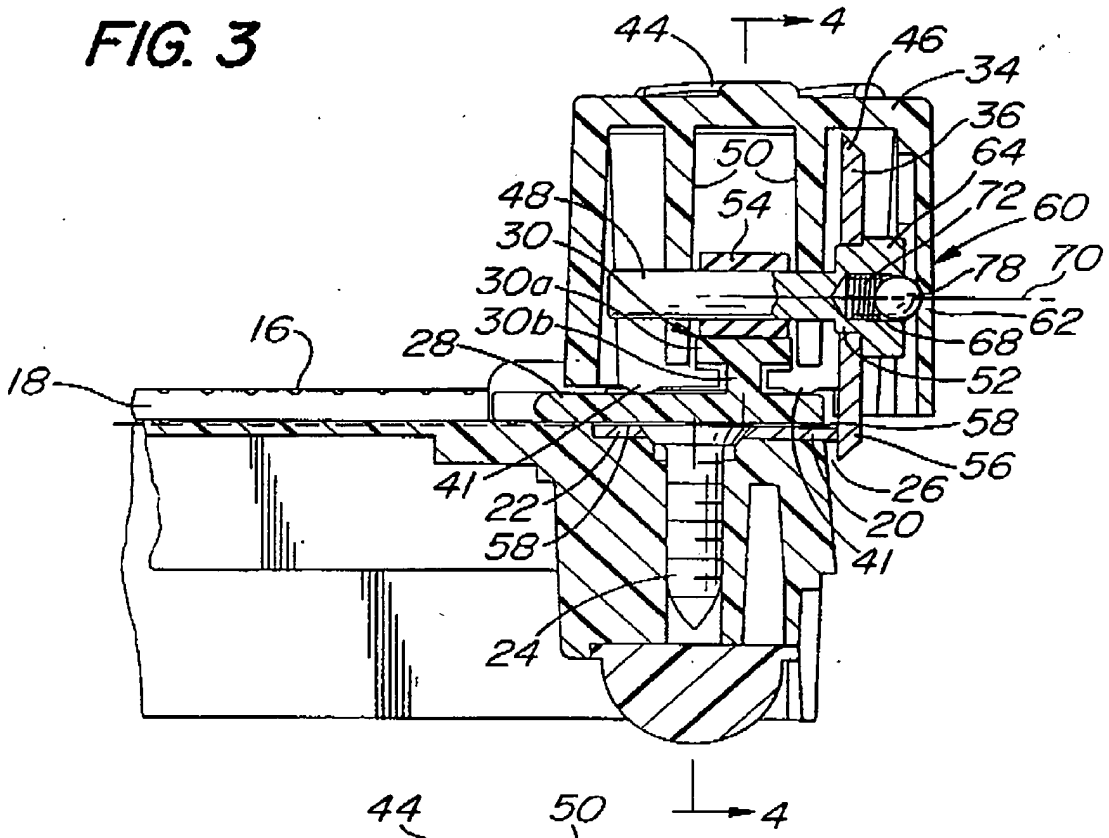



FIG. 4

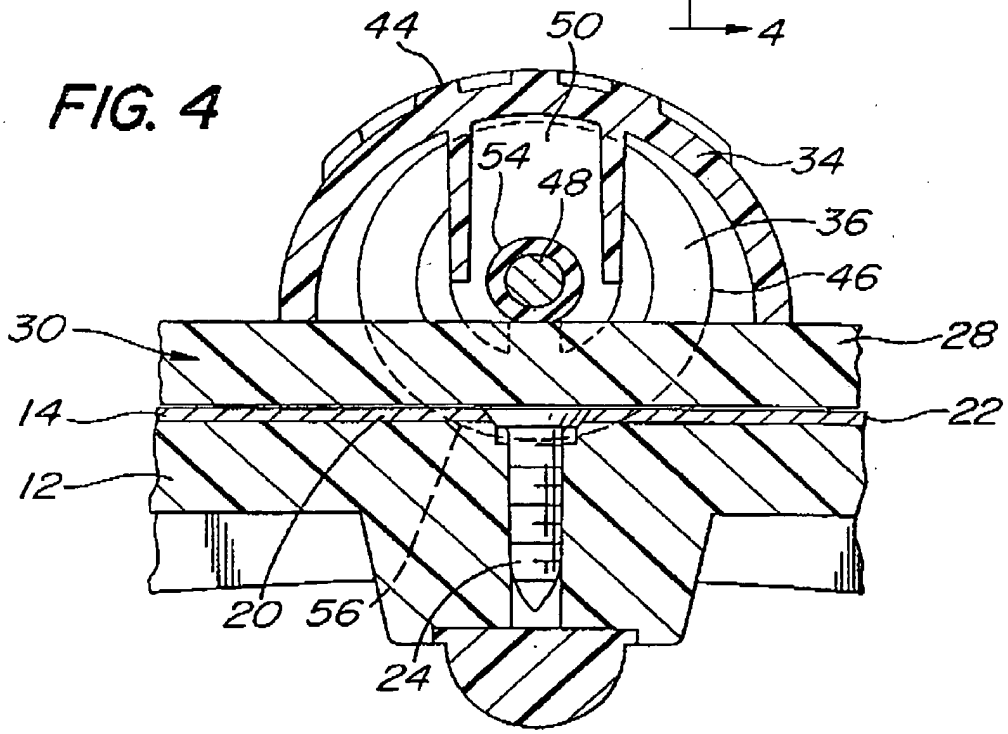
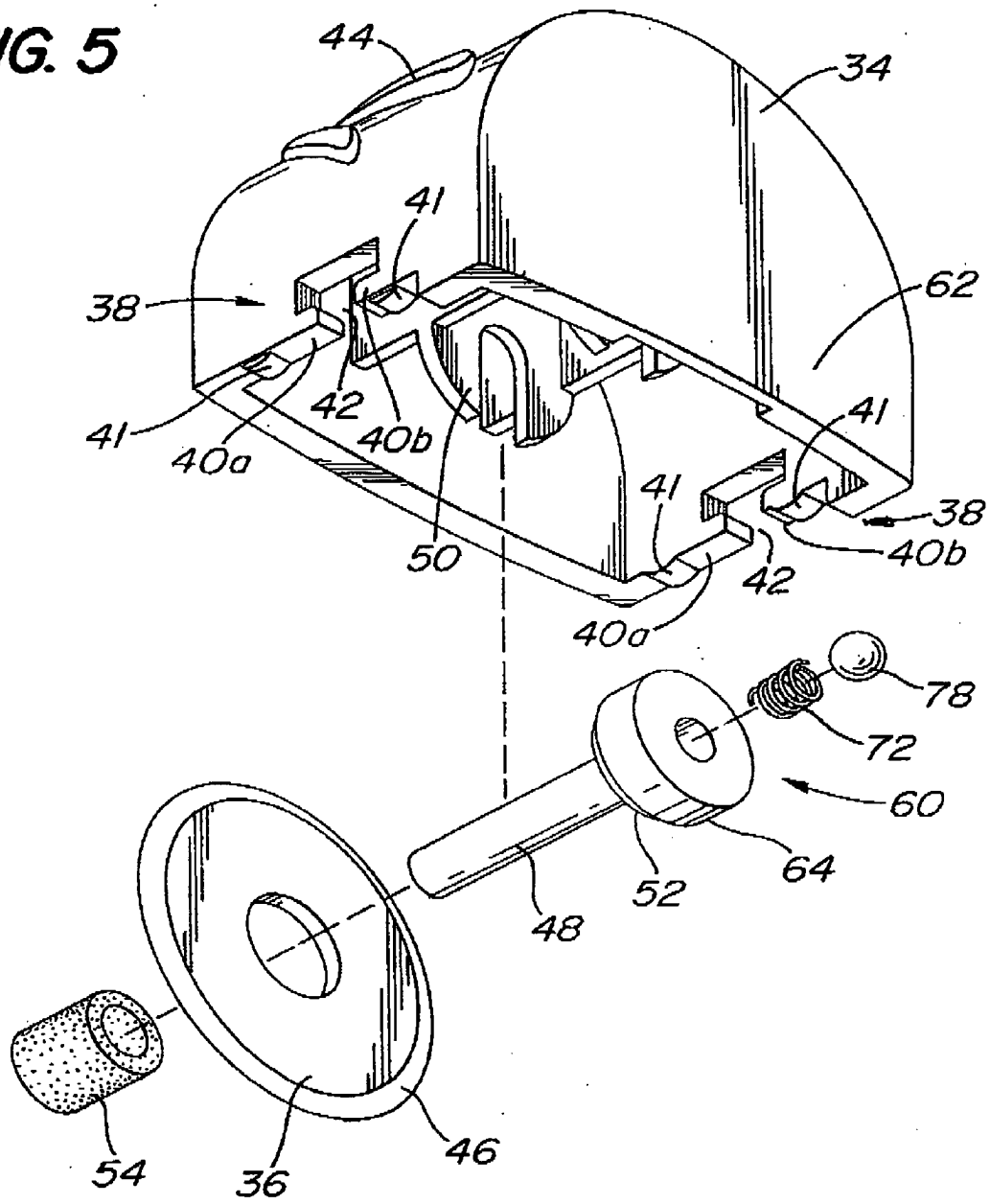


FIG. 5



# INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/10086

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :B26D 1/18, 1/20; B23D 19/02
US CL :83/489, 468, 508, 578, 582, 614
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 83/468, 471.2, 478, 485, 487, 488, 489, 501, 502, 508, 544, 578, 582, 584, 614, 636, 675, 676

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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Date of the actual completion of the international search
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/10086

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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